CLAIMS

1. A bone prosthesis (10) comprising a first portion (32) for engaging a first bone segment (14) characterised in that the bone prosthesis (10) further comprises at least one means for propagating acoustic energy (30) to said first bone segment (14).

2. A bone prosthesis (10) according to claim 1 further comprising a second portion for engaging a second bone segment (26).

3. A bone prosthesis (10) according to claim 2 in which comprises at least one means for propagating acoustic energy to said second bone segment.

4. A bone prosthesis (10) as claimed in either of claims 1, 2 or 3 in which the at least one means for propagating acoustic energy to the corresponding bone segment comprises at least one channel.

5. A bone prosthesis (10) according to claim 4 wherein said channel includes an interior reflective surface (42) which defies a resonating chamber (34) disposed through at least one of said portions (14, 18).

6. A bone prosthesis (10) according to claim 5 wherein said resonating chamber (34) includes at least one opening (22) for receiving acoustic energy.

7. A bone prosthesis (10) according to claim 6, wherein said resonating chamber (34) is convoluted.

8. A bone prosthesis (10) according to any one of claims 4 to 7 wherein said bone prosthesis (10) further comprises a transducer (144) disposed to receive acoustic energy (30) and emit acoustic waves (30') through said channel.

9. A bone prosthesis (10) according to claim 2 wherein said means for propagating comprises a transducer collar (546) which engages one of said portions.

10. A bone prosthesis (10) according to claim 2 wherein said means for propagating includes a transducer (144) disposed adjacent at least one of said portions.

11. A bone prosthesis (10) according to claim 2 wherein at least one of said portions includes a porous coating wrapped therearound.

12. A bone prosthesis (10) according to claim 11 wherein said means for propagating includes a piezoelectric membrane material which is disposed between said porous material and an outer periphery of said portion.

13. A bone prosthesis (10) according to claim 11 wherein said means for propagating includes a piezoceramic membrane material which is disposed between said porous material and an outer periphery of said portion.

14. A bone prosthesis (10) according to claim 4 wherein the prosthesis includes a ball portion for engaging the acetabulum (16) of the pelvic bone (26) and said first portion is an implant for engaging the medullary canal (38) of the femur (14).

15. A bone prosthesis (10) according to claim 14 wherein said channel includes an interior reflective surface (42) which defines a resonating chamber (34) disposed through said implant.

16. A bone prosthesis (10) according to claim 15 wherein said resonating chamber (34) includes at least one opening (22) for receiving acoustic energy (30).

17. A bone prosthesis (10) according to claim 14 wherein an outer periphery of said implant (732) is patterned to promote acoustic wave propagation along an outer surface of said implant.

18. A bone prosthesis (10) according to claim 15 wherein said resonating chamber (34) includes a plurality of slots which

extend outwardly from said resonating chamber (34) to transmit acoustic energy (30) directly to the medullary canal (38).

19. A bone prosthesis (10) according to claim 4 wherein the first portion engages the medullary canal (38) of the humerus and a second portion engages the medullary canal of the ulna; and wherein said first and second portions are movable relative to one another about a pivot.

20. A bone prosthesis (10) according to claim 19 wherein each of said portions includes a channel, each of said channels including an interior reflective surface (42) which defines a resonating chamber (34) disposed through each of said portions.

21. A bone prosthesis (10) according to claim 20 wherein each of said resonating chambers (34) includes at least one opening (22) for receiving acoustic energy (30).

22. A bone prosthesis (10) according to claim 19 wherein an outer periphery (732) of at least one of said portions is patterned to promote acoustic wave propagation along an outer surface of said portion.

23. A bone prosthesis (10) according to claim 4 wherein the first portion engages the femur (14) and a second portion engages the tibia, said first and second portions being movable relative to one another upon movement of one of the femur and the tibia (818).

24. A bone prosthesis (10) according to claim 23 wherein said first portion includes at least one dowel (842a, 832a) which engages a corresponding bore associated with the femur (14) and said second portion includes at least one dowel (842a, 832a) which engages a corresponding bore with the tibia (818).

25. A bone prosthesis (10) according to claim 24 wherein said channel includes an interior reflective surface (42) which

defines a resonating chamber (34) disposed through each of said dowels (842a, 832a).

26. A bone prosthesis (10) according to claim 25 wherein each of said resonating chambers (34) includes at least one aperture (22) for receiving acoustic energy (30).

27. A bone prosthesis (10) according to claim 23 wherein said first and second portions include outer surfaces which pivotally engage one another and bone-facing inner surfaces which engages the femur (14) and tibia (818) respectively.

28. A bone prosthesis (10) according to claim 27 wherein said first portion is generally U-shaped and encompasses the patella of the femur (14) and said second portion is generally T-shaped and fits atop the tibia (818).

29. A bone prosthesis (10) according to claim 27 wherein said channel includes a plurality of grooves located along said bone-facing inner surface of one of said first and second portions.

30. A bone prosthesis (10) according to claim 24 wherein at least one of said dowels of said first and second portions includes a plurality of grooves for propagating acoustic energy (30) therethrough.

31. A bone prosthesis (10) according to claim 27 wherein said outer surface of said second portion includes at least one recess for seating the outer surface of said first portion in a cradle-like manner.

32. A method for measuring the stability of an implanted prosthesis (10) comprising the steps of:

a) providing a source having a probe for sending and receiving signals and a comparator for comparing and analysing prior signal data with newer signal data;

b) placing said probe adjacent said prosthesis (10);

c) transmitting an initial signal through said probe to said prosthesis (10);

d) receiving a return signal from said probe after said signal propagates and returns through said prosthesis (10);

e) storing said return signal data;

f) repeating steps (a) through (e); and

g) comparing and analysing stored return signal data to determine implant stabilization.

33. A method for measuring the stability of an implanted prosthesis (10) comprising the steps of;

a) providing a source having a probe for sending signals and a comparator for comparing and analysing prior signal data with newer signal data;

b) providing a receiving sensor which connects to said source and monitors said signals as said signals propagate through said prosthesis (10);

c) placing said probe adjacent said prosthesis (10);

d) placing said receiving sensor along said prosthesis (10);

e) transmitting signals through said probe to said prosthesis (10);

f) monitoring said signal with said receiving sensor as said signal propagates through said prosthesis (10);

g) storing said signal data;

h) repeating steps (a) through (g); and

i) comparing and analysing stored signal data to determine implant stabilization.

34. A method for stabilizing an implanted prosthesis (10) comprising the steps of:

a) providing a bone prosthesis (10) having a first portion and at least one channel for propagating acoustic energy (30) therethrough;

b) engaging said first portion within a first a bone segment; and

c) periodically directing acoustic energy (30) at said first portion such that acoustic energy (30) is transmitted through said channel to said first bone segment to stimulate bony ingrowth.

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